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# Performance of Ideation Projects based on Task Characteristics

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*Completed Research Paper*

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## Abstract

*The purpose of this present research is first to analyze how the process of ideation has unfolded in community-supporting platforms, exploring ideation patterns and thereby the identification and analysis of how task characteristics that influence the contribution performance in ideation projects. Building a model based on task design theories for task characteristics and problem-solving theory, this study is addressing this aim with an empirical analysis of 335 ideation projects that vary based on task characteristics. The results from a negative binomial model indicate that while reward and specified task topics have a positive impact on the success of ideation; sector information as an alternative task characteristic has an inverse effect.*

**Keywords:** Ideation, task characteristics, community-supporting platforms, contribution performance

# Introduction

The implications of the Digital Era are immense: the increasing use of information and communication technologies (ICTs) supports and transforms the communication of people, especially in terms of knowledge creation, knowledge sharing, and acts as an important tool to support innovation process. As today business environment does not allow companies to produce and manage ideas autonomously, there has been a significant shift lately to utilize virtual tools for innovation in a diversity of forms such as open source, crowdsourcing or innovation intermediaries (von Hippel 2001; Harison & Cowan 2004; von Hippel & von Krogh 2003) to co-operate with customers, suppliers and third parties. Among such online community-supporting platforms, innovation intermediary and crowdsourcing became popular alternatives to provide necessary source of innovation externally as competition intensifies for organizations that challenge more to sustain growth and profitability (Hurley & Hult 1998).

Traditionally, the capacity for innovation was limited to inter-organizational resources such as ideas that are generated through the ideation (also called idea generation) stage of innovation process. This is why managers are more experienced in managing and executing projects than in ideation, likewise most of the prior studies have analyzed the testing and commercialization phases of innovation process than ideation. However, based on the common conceptualization of Crawford (1983), idea generation is the fundamental and distinct component in models of innovation in organizations (West 2002; Shalley, Zhou & Oldham 2004; Litchfield, 2008). A successful innovation is highly depended on a functioning and opulent ideation phase for achieving competitive advantage (Mariello 2007; Gordan, Schoenbachler, Kaminski & Brouchous 1997). All of these dynamics create an increasing emphasis on ideation that was overshadowed by other concepts of innovation process.

However, despite the importance of ideation and the increasing role of community-supporting platforms on that, online ideation process and the factors effecting this process within such platforms are rather unknown. This is also a challenge faced by platform managers who struggle to attract high levels of contributions as participation to idea scouts (also referred as challenges or projects) for enhancing ideation process. Hence, what is important to understand is how online communities works as new modes of ideation to enhance innovation process, how the ideation occur within such communities and finally how platform managers improve contribution to idea scouts.

This paper addresses the stated research gap by examining the idea generation projects in an innovation intermediary context to answer the following research question: (1) what is the general pattern of idea generation in innovation intermediary platforms? (2)Which task characteristics are essential for a rich ideation stage? Hence, the objective of this study is two-fold: (1) to examine the ideation process within a virtual context, and (2) to explore and test task characteristics for a successful ideation project.

# Review

Overall, ideation concept has been studied in the strands of creativity (Massetti 1996; Smith 1998; Karnia & Shalev 2004; Sowery 1989), innovation management (McAdam & McClelland 2002; Hansen & Birkinshaw 2007; Fernandes, Vieira, Medeiros & Jorge 2009) and learning (King 1995; Brown & Duguid 1991; Howells 2002). How to generate new innovative ideas was one of the key questions that these strands have concentrated on mostly. Yet, these studies were focusing on internal sources of idea generation with a number of case studies (LaComb, Barnett & Pan 2007; Chen, Goes, Marsden & Zhang 2010; Soukhoroukova, Spann & Skiera 2012). While these studies resulted that online ideation leads more participation than traditional idea generation techniques, they were mainly based on a single type of task question and without differentiating considering task differences.

Studies on community-supporting platforms mainly focused on the factors affecting intention to participate in online communities (Kollock 1999; Lakhani & Wolf 2005; Bagozzi & Dholakia 2006) by applying uses and gratifications theory (Sheldon 2012), and their role in innovation (Howells 2006; Hoppe & Ozdenoren 2005; Stewart & Hyysalo 2008). The literature on such platforms is mainly composed of case studies such as cases on NineSigma, yet2.com and InnoCentive while mainly focusing on managerial implications (Bauman 2000; Huston & Sakkab 2007, Lakhani, Jeppesen, Lohse & Panetta 2007) and only a few empirical studies related to their performance were conducted at the commercialization phase (Lakhani et al. 2007; Howells 2006). Regarding the online innovation projects, the papers of Katila and Ahuja (2002) and Laursen and Salter (2006) both explored that such collaborations allow spanning their boundaries and present more prosperous results. Even within the innovation literature, earlier stage R&D, ideation, has been ignored (Du, Leten & Vanhaverbeke 2012; West et al. 2014).

## *Task Characteristics*

The nature of online communities often involves task (project) completion through idea scouts for a need of a product, service or solution (Jones & Rafaeli 2000; Stanoevska-Slabeva & Schmid 2001). Thus, the ideation process in such communities follows a problem solving approach and it is constrained both by the complexity of the task (including the task characteristics) and by the limitations of the individuals` capabilities (Wang, Wang & Wei 2014). Following problem-solving theory (Simon & Newell 1971), the participant tries to solve the challenge or generate a solution as a problem solver by achieving the goal (creating novel ideas), and can receive feedback (i.e., comments from other users or moderator for correction & further improvement). Further, task characteristics of an online ideation process are still important for contribution to enhance the ideation process.

Like traditional real life tasks, online tasks also diversify, being interesting and challenging or not. Despite an individual's expertise and skills for a given task, the competence of that individual to perform the task successfully depends on the task characteristics (Shanteau 1992). This can influence on the participation in terms of contribution and eventually on the overall performance.

Task design have been a popular subject and a number of theories devoted on task characteristics aspect to understand factors that explain how desired outcomes are achieved. Specifically, the study of Shanteau (1992) specifically focusing on experts concluded that expert performance depends on the task characteristics. Among those theories Turner and Lawrence (1965) was the first to focus on the job complexity with Requisite Task Attributes Theory, Hackman and Oldham (1976) later built job characteristics model to define the core task dimensions (i.e. skill variety, task identity, task significance, autonomy, and feedback) that affect task-related outcomes such as motivation and performance. Following their model, Social Information Processing (SIP) model is introduced that relied on influencing individuals' perceptions about the task`s difficulty, challenge, and autonomy (e.g. Fried & Frris 1987). The variables of this task characteristics model in prior studies included autonomy, skill variety, task structure, task identity, task difficulty, work schedule, quality assurance, performance rating and task significance. Considering various task characteristics, all these theories aimed to discover the factors that lead individual`s responses (as psychological and behavioral) to a given task, eventually to the overall performance. Further, task characteristics were classified as intrinsic (i.e. task type, structure, requirement & process) and extrinsic (i.e. task autonomy, reward, risk, urgency, importance, locus) task characteristics within a framework that embeds task performer, relationships between performer and task (Kim & Soergel 2005; Hackman 1969).

Thus, it is crucial to understand the underlying factors for providing successful idea generation processes within these platforms. Especially considering that, fruitful idea generation could be supported with the appropriate task characteristic that can be provided by the platform and organizations. Moreover, the review of earlier research has shown that the bulk of past research (e.g., Lakhani & Wolf 2005; Bagozzi & Dholakia 2006; Chen & Hung 2010; Tsai & Bagozzi 2014; Zhao, Stylianou & Zheng 2013; Ray, Kim & Morris 2014) focused on social and individual (in terms of motives and cognition) factors. Despite the growing interest, the function of ideation in them remains largely under-explored (McAdam & McClelland 2002). However, for an innovation to be successful, managers need to know the underlying factors for a successful ideation process through idea scout projects. Task characteristics of such projects are crucial but often overlooked factor to understand contribution performance. Thus, this study is addressing this gap with an empirical analysis of 335 idea generation projects from 2008 and 2014 within an online community.

## Hypotheses Development

Following task design theories for task characteristics (Kim & Soergel 2005; Hackman 1969), and problem-solving theory (Simon & Newell 1971) and through the participant observations on such community- supporting platforms, online task characteristics are expected to provide insights into the relationships between online task characteristics and task performance. Extrinsic characteristics such as reward, company (task importance) and lifespan (urgency) and intrinsic characteristics such as question types (task type), sector type (task scope), and length (representative of the task structure) were selected as they can have a potential impact on the success of the projects. This study considers success of projects as measure by the number of ideas created for each project. It is assumed that the individual factors such as expertise and knowledge are not a factor due the type of question, general ideation that lacks knowledge-driven or expertise-based aspects. The research model and hypotheses depicted in the Figure 1.

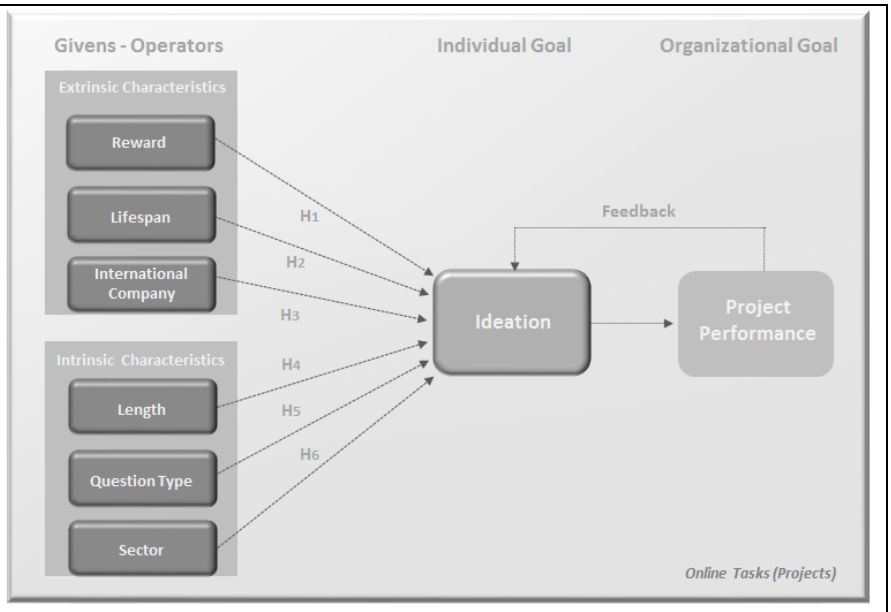


**Figure 1. Research Model**

Analyzing at the individual level, prior studies (e.g. Lakhani & Wolf 2005; Bagozzi & Dholakia 2006) concluded that community members' intention to contribute rely on both intrinsic and extrinsic factors. However, specifically, monetary rewards as an extrinsic factor has inconclusive effects on participation, some find positive associations (e.g. Koohikamali, Gerhart & Mousavizadeh 2015; Bartol & Locke 2000), others found not a strong and even a negative affect (e.g. Martineza & Waltonb 2014). Further, resource allocation problems in task selection also exist for community members in terms of time and energy to spend for a project. The user choice is related to success as the participation number, in this case number of ideas created, correlates with innovative idea generation. The project participants receive a reward for successful outcomes to compensate their contribution; this creates incentives for the participants to achieve project success (Ashcraft 2009). Thus, reward is a crucial element of project planning process (Jolayemi, Olorunniwo & Pennington 2003) and it can be used to achieve success in the project execution. Accordingly, analysis of rewards as a task characteristic is necessary.

H1. Ideation tasks with higher rewards have higher contribution performance.

An increase in the duration to complete a task, project lifespan, not necessarily associates with better ideas or more ideas, it could even hamper the decision process (Lassiter, Lindberg, Gonza´lez-Vallejo, Bellezza & Phillips 2009; Newell, Wong, Cheung & Rakow 2009). For instance, several experiments conducted by Hess, Queen, and Patterson (2012) concluded that given additional time decision process do not enhance their decision quality, could even damage it. Especially considering that ideation do not often require long period of decision or completion, having longer period of task duration should not necessarily lead to better ideas or more ideas.

H2. Ideation tasks with longer lifespan have lower contribution performance.

Another task characteristic related to the companies identity, whether it is internationally renowned company or not. This relates to the psychological distance of community members with company brands in projects. The concept of psychological distance was initially coined by Beckerman (1956) and later on popularized in mid-1970s. Psychologically distant things, including companies, brands, are not present in the direct experience of reality of community members in this case. Psychological distance is defined as factors preventing or disturbing the flows of information and such difficulties can be due to lack of direct communication, access to information and even due to the differences within language, culture, geographic distance are some of the commonly cited factors (Johanson & Wiedersheim-Paul 1975). Once the organization providing the online task is internationally renowned one, the psychological distance of participants will be lower as the brand recognition increase and they will be more motivated to devote their time for contribution.

H3. Ideation tasks of internationally renowned companies have higher contribution performance.

More information is not always better (e.g. Yates, McDaniel & Brown 1991) it can even be inimical. The study of Nisbett, Zukier, and Lemly (1981) presents dilution effect that additional information cause poorer performance. Likewise, by following the minimum description length (MDL) principle (Rissanen 1978), the more we extract the useful information, so minimize the length, the more participants understand better the task description. Thus, the primary goal in platform managers and organizations in defining the task description is to compress the information to find as many useful properties as they can. Thus, more information is not necessarily expected to lead better contribution.

H4. Ideation tasks with more length (information) have lower contribution performance.

The underlying factors that affects individual's participation have received greater attention from researchers (Lakhani & Wolf 2005; Bagozzi & Dholakia 2006). Project topic is another varying factor in idea generation projects that can increase participation. High-interest, self-selected topics can improve individual's knowledge as well as enhancing the knowledge creation. Especially considering community members who are not a part of formally structured organization participate in such platforms mainly due to their areas of interest. Thus, field of interest is directly associated with the project topics and it can increase participation. Likewise, the concept of functional proximity of individuals to task domain has a negative impact on innovation process (Schweisfurth, 2012; Harmaakorpi, Tura, & Melkas, 2011). The overall topics of idea generation projects were merged related project topic types together and it is expected that each project type have an interest group to participate in projects. In terms of sectors, it is also expected to have also positive association between the relationship between perceived importance of sectors and task performance (e.g. Leaptrott & McDonald 2015).

H5. Ideation tasks with question type (new product idea, new service idea, marketing name idea, attraction methods) have higher contribution performance.

H6. Ideation task sectors (in professional, scientific & technical activities, energy supply, financial activities, information & communication, manufacturing, other service activities, retail trade) have higher contribution performance.

# Analysis Approach

## *Ideation Patterns*

To discover the patterns, data analysis initiated with the exploration of the ideation patterns performed by community. Based on the analysis of ideation projects, a general pattern of ideation was evaluated. This pattern follows 3 phases. In the first movers phase, it is observed that leading members of the community upload new ideas as soon as the project is posted. This leads acceleration in the graph until the uploaded ideas' number reaches up to 800 or 900. According to platform manager, this is the phase where most of the best ideas are generated in. However, this acceleration eventually slows down and then declines to a point where it follows a more stabilized pattern. This is defined as the criticism phase in which community members mainly focus on the existing ideas, as they believe that there are enough. Here, idea attempts continue at a constant rate but mainly members focus on making comments, giving feedbacks to each other and combining existing ideas to improve them further. These feedbacks improve the existing ideas and this process lasts until the

deadline of the project. While reaching to the end of the project, some members upload new ideas either they kept it to the last minute or they recently saw the post and this is why this phase is entitled as the last-ditch. However, new ideas in this phase cannot receive any comments or feedbacks to advance them.

Innovation intermediary tries to keep the first phase of the graph as flat and long as possible. However, the longer the second phase people get less responsive to the project. According to platform manager, the best ideas come from the first phase as they are discussed and developed collaboratively. He also believes that if the middle phase can be shortening, this could cut the project period 2 to 4 weeks. This would accelerate the ideation process for innovation.

Further, the overall participation pattern, including ideas, comments, and rating, is examined for all projects (See Figure 2). The number of proposed ideas follow a long tail structure fitting an exponential distribution of the form y=b m^x, with b = 594-788 and m = 0.94752 and R2 =0.959312. They also fit a Zipf distribution of the form y≅C r^(-b), where r corresponds to the ranking. In this case, the best fit corresponds to b = -1.7433 and C = 20,696.98 with a R2 of 0.907591.

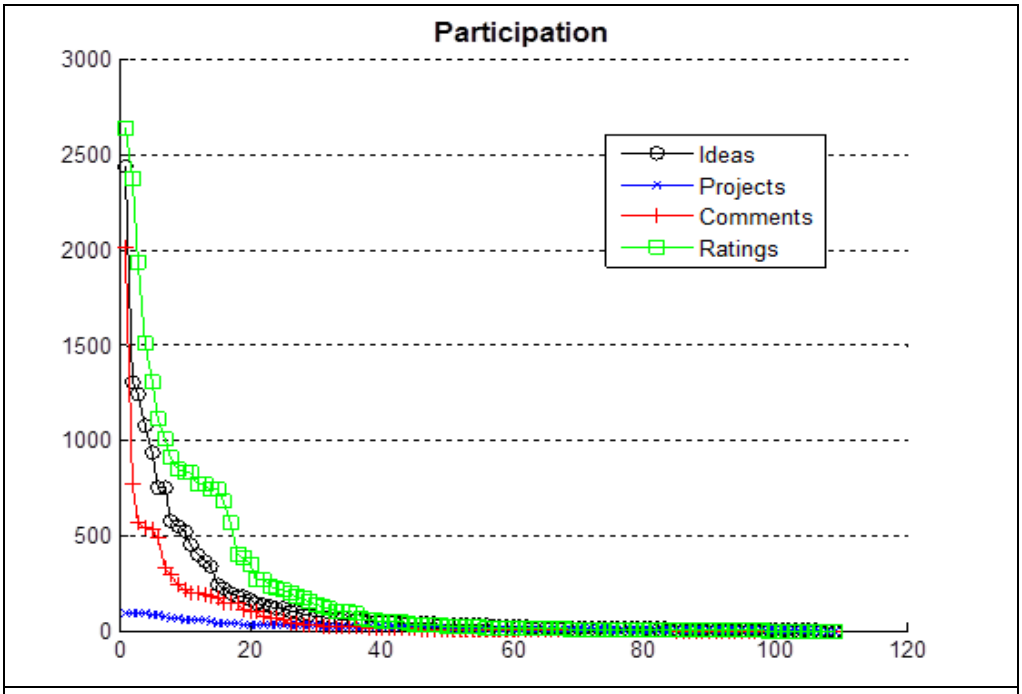


**Figure 2. Overall Participation Pattern**

## *Data*

Here the intention by conducting this research is to identify the general ideation pattern in an online context, examining the evolution of this idea generation patterns in time and explore the success factors for the ideation projects. To achieve these, a variety of data was collected through structured in-depth interview with manager of innovation intermediary, participant observations in their internet platform, informal talks, working documents and data for their all ideation projects. Ideation project data were collected as log files, for 335 projects from 2008 and 2014, on September 2014. Descriptive statistics for the described variables are presented in Table 1. The number of ideas, reward size, company information, duration of the project and number of wording used for project description were computed from the log files for each project. Questioned were grouped under the type of outcome that platform owners were seeking for such as new product idea, new service idea, attraction methods, marketing name idea, and other ideas. Sector is computed based on company that is functioning under the International Standard Industrial Classification of United Nations (2008).

These were professional, scientific & technical activities, energy & supply, financial activities, information & communication, manufacturing, retail trade and other service activities.

| Variable | N | Mean | Std. Dev. | Min. | Max. | Variance | Skewness |
|---|---|---|---|---|---|---|---|
| NoIdeas | 335 | 399.62 | 154.29 | 74 | 861 | 23803.8 | 0.49 |
| Reward | 335 | 1661.95 | 955.10 | 0 | 7212 | 912209.8 | 1.75 |
| Sector | 335 | 4.56 | 1.64 | 1 | 7 | 2.67 | -0.85 |
| Length | 335 | 68.21 | 45.62 | 14 | 234 | 2080.9 | 1.30 |
| Question | 335 | 3.42 | 1.65 | 1 | 6 | 2.72 | -0.20 |
| Lifespan | 335 | 34.4 | 17.13 | 0 | 92 | 293.35 | 0.78 |
| Company | 335 | 0.39 | 0.49 | 0 | 1 | 0.24 | 0.45 |

**Table 1. Descriptive Statistics**

## *Regression Model Specification for Count Data*

The dependent variable, number of ideas, is a count of the number of ideas generated during a project by all the participants, also being non-negative integer. However, the data presents overdispersion as the variance of the dependent variable (23803) is substantially larger than its mean (399). Likewise, the results of one-sample Kolmogorov-Smirnov test for Poisson distribution is significant for the dependent variable and this presents that it is not following a Poisson distribution. Since the data shows evidence of overdispersion and not following a Poisson distribution, negative binomial models were preferred to be employed over the Poisson (Cameron & Trivedi 1998) to explore ideation behavior in online projects (or project success factors).

To test our hypotheses, the model can be expressed as:

$$\log(number\ of\ ideas) = \alpha_0 + \alpha_1(reward) + \alpha_2(lifespan) + \alpha_3(company) + \alpha_4(lenght) + \Sigma_i \alpha_{5i}(\text{question}) + \Sigma_j \alpha_{6j}(\text{sector}) + \varepsilon$$

where α is a vector of regression coefficients and ε is the error term. A series of dummy variables for Question and Sector were incorporated to control heterogeneity across different projects. Logarithmic transformation is performed for highly skewed variables such as length, reward and lifespan.

## *Results*

Table 2 presents the results of the negative binomial regression analysis. With respect to the direction of the regression effects, all of the variables received positive exp(β) weights, expect sector types. This supports H1 and H5. All the sector types present to an inverse association with the outcome variable, rejecting H6. However, the findings do not speak to H2, H3, and H4. The exponentiated coefficient (incident rate ratio) coefficients assist the comparison of relative importance of the different parameters. Specifically, new product ideas was the strongest predictor of generated number of ideas, the incident rates increasing about 31%, presenting that ideations on product ideas are preferred as they generate higher participation in terms of ideas. Yet, information & communication related tasks have the highest incident rate that decrease with 38%.

| Intercept | B | Exp(B) | Std. Err. |
|---|---|---|---|
| (Intercept) | 5.477*** | 239.077 | 0.21 |
| Reward | 0.143*** | 1.154 | 0.04 |
| Company | -0.209 | 0.811 | 0.16 |
| Lifespan | 0.131 | 1.139 | 0.09 |
| Length | -0.001 | 0.999 | 0.00 |
| Question | | | |
| Attraction Methods | 0.127* | 1.135 | 0.07 |
| Marketing Name Idea | 0.200** | 1.222 | 0.08 |
| New Product Idea | 0.271*** | 1.312 | 0.08 |
| New Service Idea | 0.177** | 1.193 | 0.08 |
| Other Ideas | - | 1 | |
| Sector | | | |
| Professional. Scientific & Technical Activities | -0.394*** | 0.674 | 0.10 |
| Energy Supply | -0.323** | 0.724 | 0.14 |
| Financial Activities | -0.307** | 0.736 | 0.10 |
| Information & Comm | -0.480*** | 0.619 | 0.10 |
| Manufacturing | -0.155 | 0.856 | 0.08 |
| Other Service Activities | -0.299*** | 0.742 | 0.09 |
| Retail Trade | - | 1 | |
| (Neg. binomial) | 0.125 | | 0.01 |
| *LR $x^2$ ( df:15. N = 335)* | *73.470* *** | | |
| *Deviance / df* | *1.078* | | |

** p < .05. ** p < .01. *** p < .001.*

**Table 2. Model Parameter Estimations**

## Discussion & Conclusion

By testing the traditional task characteristics in an online context, this study presents an initial step toward an understanding of internet-based ideation process and examines the relationships among task characteristics and contribution performance for ideation. Unlike to the previous studies (e.g. LaComb, Barnett & Pan 2007; Soukhoroukova, Spann & Skiera 2012), this study considers the differentiating the role of task differences rather than focusing on a single task question type. Based on our analysis, there are two possible effects leading a common pattern that we observed in figure 2. First, people in the first phase of the graph are the ones who have a mindset of "release early and often". Then once there are about 250-300 ideas, community stop putting new ideas. In the final phase is close to the deadline that is the second affect. Here is where people willing to share their idea that they do not want any critiques. Generally, these people are the ones who think that they are the best ones.

During the analysis, another issue is addressed whether there are certain task characteristics that affect the success of ideation projects. The characteristics of the idea scout projects as task characteristics can be used to identify the factors that increase the attractiveness of the projects and attract more ideas eventually. If a project has high rewards, this means there are clear monetary (extrinsic) incentives. The results suggested that ideation projects with high rewards with a specific task topic (e.g. on the new product idea or marketing name), rather than a specific sector, receive more participation and expected to be more successful. The positive relationship of rewards on ideation also matches with the prior studies that present monetary rewards as the main motivational factor in online communities (Davis 1989; Igbaria, Iivari & Maragahh 1995; Antikainen & Väätäjä 2008). Community members generate more ideas for the projects with higher rewards. Yet, the impact of reward is rather weak compared to question type and this can be explained with the existence and the importance of alternative motives as well.

Even though each topic has a different interest group, new product idea related tasks particularly attract many members to generate ideas. More importantly, participants prefer to be informed about

the type of task topic instead of sector type. With the specified task sector, participants could feel a lack of expertise or lack of knowledge regarding the industry.

Such a thorough analysis of ideation process provides useful insights on the management of innovation process and help researchers to form new hypotheses. Knowing that organizations are interested in achieving the best results in a short time period, the number of contributions is essential to sustain such platforms and generate a successful innovation process. Based on the findings, platform managers and organizations can focus on increasing the reward and emphasizing the task topic to encourage contributions. Yet, participants would still like to prefer certain topics to others but platform managers can still attract higher contributions for instance, by increasing their rewards compared to others.

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